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Pre-flood hazard mitigation plan for the



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# PLEASE RETURN

Pre-Flood Hazard Mitigation Plan

for the

City of Missoula

and Missoula County

Montana

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August, 1983

Prepared By the

Department of Natural Resources and Conservation

Floodplain Management Section

In Cooperation with the

City of Missoula

and Missoula County

## Introduction

### Purpose

The purposes of this Pre-Flood Hazard Mitigation Plan are:

- a. to identify general flood hazards in the community,
- b. to describe existing efforts to reduce flood damages in identified areas,
- c. to guide and encourage local community officials in taking further action as may be reasonably expected to enhance mitigation efforts,
- d. to identify and support applications for financial assistance to implement ideas and suggestions consistent with community objectives which will reduce flood damages.

### Scope

This plan identifies opportunities to reduce future damages from the flooding sources identified, in the Missoula City and County Flood Insurance Studies produced by the Federal Emergency Management Agency. The plan takes a comprehensive look at what has already been done to reduce flood damages and develops suggestions of action that can be taken to reduce the physical and monetary effects of future floods.

### Funding

The funding source for the plan was provided under the State Assistance Program (SAP) grant administered by the Federal Emergency Management Agency (FEMA).

The SAP grant allows the Floodplain Management Section of the Department of Natural Resources and Conservation (DNRC) to assist with local community efforts in reducing future flood damage losses.

### Authority

Authority for the City of Missoula and Missoula County to guide future development in flood-prone areas is provided by:

City Ordinance Number: 2299

County Resolution Number : 83-73

The Montana Floodplain and Floodway Management Act (MCA 76-5)

The National Flood Insurance Act of 1968

The Flood Disaster Protection Act of 1973

### Definitions

The following definitions are offered as a guide toward better understanding the similarities between the concepts discussed in this plan.

Hazard Mitigation -- A plan "to alleviate, by softening and making less severe, the effects of a major disaster or emergency and of future disasters in the affected areas, including reduction or avoidance. Hazard mitigation can reduce the severity of the effects of flood emergency on people and property by reducing the cause or occurrence of the hazard; reducing exposure to the hazard; or reducing the effects through preparedness, response and recovery measures. Hazard mitigation is a management strategy in which current actions and expenditures to reduce the occurrence or severity of potential flood disasters are balanced with potential losses from future floods."

Floodplain Management - A comprehensive approach "to reduce the damaging effects of floods, preserve and enhance natural values and provide for optimal use of land and water resources within the floodplain. Its goal is to strike a balance between the values obtainable from the use of floodplains and the potential losses to individuals and society arising from such use."

Emergency Preparedness - A process to "reduce vulnerability of people and communities of this state to damage, injury, and loss of life and property resulting from natural or man made catastrophes."

Flood - "A general and temporary condition of partial or complete inundation of normally dry land areas from (a) the overflow of streams, rivers, or other inland water bodies or (b) the unusual and rapid accumulation or runoff of surface waters from any source."

#### Identification of Flood Problem

Flooding generally occurs in May and June as winter snow in the higher elevations begins to melt. Warming periods, sometimes accompanied by rainfall cause tributaries to swell rapidly. The resulting floodflows may be localized or basinwide, lasting from a few hours to several days, depending on temperature changes, amount of rainfall, soil moisture content, and soil permeability. Shallow flooding may occur due to high ground water tables and impounding of runoff water in low areas having poor drainage.

The steep topography of the surrounding hills creates other problems as urbanization continues and natural storage capacities are being eliminated causing more runoff to occur.

#### History of Flooding

Several major floods have occurred in the Missoula County area (including the City of Missoula) but none as severe as the 1908 flood that destroyed homes, roads, bridges and disrupted travel for several weeks.

Flooding in recent times has occurred in 1948, January 1962, December and June, 1964, December 1967, June 1974, June 1975 and March 1976.

While there were significant floods, damage usually was restricted to one waterway. The June 1974 flooding along the Bitterroot River equaled a 50-year peak discharge frequency, but the Clark Fork River discharge was less than a 5-year frequency.

#### Flood Protection Measures

Flood protection measures in the Missoula County area (including the City of Missoula) appear to be minimal. These consist of the following:

Bank shaping and rock riprap placement for streambank stabilization at intermittent locations, mostly individual efforts.

Intermittent earth dikes that offer some protection, but only one or two protect against the 100-year flood along the Clark Fork River near Missoula.

The City of Missoula and Missoula County are in the Regular Phase of the National Flood Insurance Program and are enforcing comprehensive flood damage reduction regulations.



### Future Flood Protection Measures

The combined City/County have developed plans and are now initiating projects that will reduce or eliminate some flooding problems.

The Pattee Creek Canyon and South Hills area has had a Storm Drainage Project studied. This project, if constructed, is expected to eliminate most of the flooding problems in the Pattee Creek and South Hills area.

The City Sewage Treatment Plant is completing the addition of a Belt Press System that will eliminate the need for evaporation ponds or storage lagoons that are presently susceptible to flooding. This system is expected to be on line by November 1983. The evaporation beds would not be used and one storage lagoon would be used as an emergency reserve.

### Emergency Preparedness

The City/County Disaster Planning Committee, formed in February 1983, has developed and adopted a planning process that determines the procedures to be followed during any probable disaster that may occur in this area. Copies of the plans are available from the County Disaster and Emergency Services Office.

The process calls for an Incident Manager response effort for each type of disaster. This allows the County Disaster and Emergency Services Coordinator the freedom to observe and coordinate response efforts where they are most needed.

The Incident Managers are responsible for manpower and equipment needed for the response effort of each type of disaster. Each type of disaster involves different Incident Managers response.

#### Mitigation Recommendations

These recommendations have been developed as assistance and guidance for the local community officials. They are not required actions. However, it is strongly suggested that when achievable, these recommendations be implemented.

Long-term solutions to mitigate flood problems:

- a. Increase the public's awareness of the flood hazards and correct construction practices. Elevate their knowledge of the flood-prone areas and describe techniques to reduce flood damages to existing structures. Reinforce the idea of purchasing Federal Flood Insurance as a way of reducing the economic impact of a flood disaster.



b. Continue to enforce the flood damage reduction regulations for new construction and substantial improvements in flood-prone areas identified on the Flood Insurance Rate Maps (FIRM) and Flood Boundary and Floodway Maps developed by the Federal Emergency Management Agency.

#### Specific Areas of Concern

City of Missoula

NFIP Community Number: 300049

FIRM Panel Number: 0005B

Effective Date: January 6, 1983

#### Areas of Concern

These areas were identified by the community officials.

- City Sewage Treatment Plant (near Reserve Street)
- Fill behind Holiday Inn (Mullan Road)
- River Front Park Dike Relocation (Below Higgins Street Bridge)
- Clark Fork Station Restaurant

#### Existing Mitigation

- Intermittent dikes along both sides of the Clark Fork River.
- Sewage Plant circular mixing tank walls are above the 100-year flood elevation.
- \*South Hills Drainage Plan-expected to be completed when funding becomes available.
- \*Improved City Sewage Treatment Plant to be on line November 1983.

## Recommended Mitigation Measures

### 1. City Sewage Treatment Plant

- a. The new Belt Press System being installed at the City Sewage Treatment Plant will eliminate the need for the evaporation beds and storage lagoons.
- b. The no longer used evaporation beds and storage lagoons should be cleared of any possible contaminants.
- c. If there is a need for one emergency storage lagoon, it should be rehabilitated to withstand the impacts of a 100-year flood.
- d. Improve existing dike along the Clark Fork River in front of the treatment plant.

### 2. Fill behind the Holiday Inn on the Clark Fork River

- a. Determine if property owner has obtained the necessary permits (building and floodplain development permits) and has plans for construction.
- b. If there are plans for construction, ensure compliance with the City of Missoula Flood Damage Reduction Ordinance.
- c. If there are not plans for construction, stop the filling. The filling of flood prone areas without the purpose of construction reduces the natural storage capacities. This may result in increased flood heights and velocities.

3. River Front Park is expected to be completed within five years.

- a. Determine if existing dike has significant flood protection capabilities.
- b. If it does, incorporate the dike into park development plans or relocate to continue its protection capabilities.
- c. Ensure that the development of the new park is in compliance with the City's Flood Damage Reduction Ordinance and other state and federal regulatory requirements.
- d. If the dike does not offer significant protection, investigate the feasibility of improving the protection capability to meet the U.S. Army, Corps of Engineers (USACE) dike criteria provided it doesn't raise the water surface profile and cause increased flooding elevations.

4. Clark Fork Station Restaurant

- a. It was determined that the natural ground level surrounding the restaurant is three (3) feet higher than the 100-year flood elevation. No significant flood threat is apparent.

\*Many homes were observed along the banks of the Clark Fork and Bitterroot rivers, some are protected by inadequate dikes. Flood insurance should be encouraged to be purchased by the home owners. Investigate the feasibility of improving the dikes to USACE criteria.

Missoula County

NFIP Community Number: 300048

FIRM Panel Number: 0001-1900 .

Effective Date: August 15, 1983

#### Areas of Concern

These areas were identified by community officials.

- Harper's Bridge
- Pre-Existing Structures in Floodplain
- Inadequate Bridge and Culvert Sizes
- Health Hazards from Sewage
- Inadequately Constructed Dikes
- Gravel Pits in Floodplain
- Fill in Floodplain
- Severe Bank Erosion

#### Existing Mitigation

- Intermittent dikes along the Clark Fork River (Panels 1195 and 1460) and Lolo Creek (Panel 1755).

-Missoula County Sewage Treatment Plant near Lolo (Panel 1465) circular mixing tank walls and storage lagoon dikes are above the 100-year flood elevation.

\*South Hills Drainage Plan-expected to be completed when funding becomes available.

### Recommended Mitigation Measures

#### 1. Harper's Bridge and road (Panel 1165)

Harper's Bridge is presently closed to traffic due to its unsafe condition. A plan has been developed to relocate the approach roads and the bridge.

- a. Ensure that the proposed relocation and reconstruction design does not increase the flood hazard and is in compliance with the County's Flood Damage Reduction Regulations.

#### 2. Pre-Existing Structures in Floodplain before the Floodplain Management Program

(Panels: 1170, 1190, 1215, 1240, 1455, 1460, 1465, 1470, 1485, 1505, 1510, 1520, 1540, 1730, 1735, 1755, 1760, 1770.)

It would be very expensive to do some structural mitigation measures to these structures.

- a. Encourage the purchase of flood insurance by the structure owners.
- b. Encourage the lifting of the home and prepare a pad of fill to bring the structure in compliance with the County's Flood Damage Reduction Resolution.

c. Encourage commercial businesses to develop and provide water-tight seals for floodproofing in compliance with the County's Flood Damage Reduction Ordinance.

d. Some structures are protected by inadequate dikes, investigate the feasibility of improvement to meet USACE criteria.

### 3. Inadequate Bridge and Culvert Sizes

(Panels: 740, 850, 875, 1030, 1125, 1165, 1185, 1190, 1195, 1215, 1240, 1455, 1470, 1485, 1505, 1540, 1730, 1735, 1760.)

The majority of the culverts and bridges placed before approximately 1975 received little design for flood carrying capacity. Many of the passage ways are insufficient to carry much more than a 50-year flood frequency. This causes a back water effect, increasing the flood hazard.

a. Before the next flood event, determine the correct design for a bridge or culvert to adequately pass the 100-year flood frequency.

b. If funding and planning allows for the replacement of a restricting bridge or culvert, future flood damages could be reduced.



Replacement of a bridge or culvert might appear to be less expensive in a post-flood period, but in terms of flood recovery costs, flood damages could be less severe if there was not the back water effect.

#### 4. Health Hazards from Sewage, Compost or Dumps

(Panels: 1195, 1155, 1460, 1465)

- a. Investigate the health hazard if sewage treatment evaporation beds (Plant 901), compost piles and solid waste dumps are inundated.
- b. If there is a health hazard, develop plans to further floodproof the evaporation beds located at Sewage Treatment Plant 901 near Lolo.
- c. Determine if dump material could be relocated out of the floodplain or could be floodproofed. Investigate the idea to close the dump.
- d. Investigate the idea to relocate the compost piles out of the floodplain.

#### 5. Inadequately Constructed Dikes

(Panels: 1170, 1195, 1755, 1460)

1. Investigate the benefits of rehabilitating existing dikes to bring them in compliance with the USACE criteria.
  - a. If feasible, the USACE will redesign the dikes. New easements will be needed and maintenance agreements will need to be developed.

2. Otherwise, recommendation number 2 would apply for structures behind the dikes.

6. Gravel Pits in the Floodplain

(Panels: 1195 and 1455)

The gravel pit locations are well away from the river banks, but are in the floodplain.

a. A plan should be developed in cooperation with the pit owners that would include the removal of machinery that would receive significant flood damage or create a health hazard if inundated.

The pits may remain full of water for a period of time due to the elevation of the water table during a flood.

7. Fill in Floodplain (Panel 1215)

a. Determine if property owner has obtained the necessary permits and has plans for construction.

b. If there are plans for construction, ensure compliance of the County's Flood Damage Reduction Resolution.

c. If there are not plans for construction, stop the filling. The filling of flood prone areas without the purpose of construction reduces the natural storage capacity. This may result in increased flood heights and velocities.

## 8. Severe Bank Erosion

(Panels: 15110 and 1195)

Severe bank erosion is creating problems both in the increase deposition and the reduction of space between structures and the river.bank which could result in the structure falling into the river.

- a. Riprap placement has occurred and can continue as long as it is in compliance with the County's Flood Damage Reduction Regulations and other state and federal regulations.
- b. The removal of deposition may solve the problem for a short time, but could create other problems in the future by increasing velocities adding to the erosion problem.

